EXPERIMENTAL METHODS IN MODERN BIOTECHNOLOGY

Editors

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Homology Modelling of Pyranose-2-Oxidase from Phanerochaete Chrysosporium

Ibrahim Ali Noorbatcha, Azratul Ashimah Nur Mohd Dom, Ahmad Sidqi Harithuddin and Hamzah Mohd Salleh

1. Introduction

Recently, the hiking price of oil prompted interest in biofuels as an alternative to fossil fuels for use in transportation in many countries. Biofuels offer the promise of numerous benefits related to energy security, economics and the environment. Due to these reasons, Malaysian Government through its Ministry of Plantation Industries and Commodities introduced National Biofuel Policy in 2006. It has five strategic thrusts which are biofuel for transport, biofuel for industry, biofuel technologies, biofuel for export and biofuel for cleaner environment.

Biofuel technologies have gain interest among researchers where biological cells from organisms have been used to produce fuel. This is known as biological fuel cells (biofuel cells) which have been defined as fuel cells that rely on enzymatic catalysis for at least part of their activity (Palmore and Whitesides, 1994).

Recent advances in enzymatic biofuel cells are the development of biocathodes and bioanodes that employ direct electron transfer (DET) instead of mediated electron transfer (MET). The importance of DET is that the electrons are transferred from the catalyst (enzyme) directly to the electrode and problems associated with the use of mediators are overcome. Although DET has been observed for several enzymes in electroanalytical applications, it was not employed in a biofuel cell until 2006 when researchers developed biocathodes for the reduction of oxygen using laccase (Yan *et al.*, 2006; Zheng *et al.*, 2006) and bilirubin oxidase (Duma & Minteer, 2006) and bioanodes employing glucose oxidase (Ivnitski *et al.*, 2006).

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